UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,079	09/12/2003	Michael W. Morrow	ITL.1028US (P16764)	7093

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EXAMINER
PAN, DANIEL H

ART UNIT	PAPER NUMBER
2183	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	10/661,079	MORROW, MICHAEL W.
	Examiner	**Art Unit**	
	Daniel Pan	2183	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>10 July 2007</u>.

2a) ☒ This action is **FINAL**.   2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1,3,5,6,30 and 32</u> is/are pending in the application.

    4a) Of the above claim(s) <u>17-24 and 26-29</u> is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1,3,5,6,30 and 32</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>12 September 2003</u> is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date <u>01/06/04</u>.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

1.   Claims 1,3,5,6,30,32 remain for examination. Claims 17-24 and 26-29 have been canceled. The T.D. on 06/02/06 has been received.

2.   Applicant's election without traverse of Group I (claims 1,3,5,6,30,32) in the reply filed on 07/10/07 is acknowledged.

3.   Applicant's arguments with respect to claims 1, 3,5,6,30,32 have been considered but are moot in view of the new ground(s) of rejection. However, response to applicant remarks will be included below for clarifying the teaching of prior art.

4.   Applicant remarks :
a) Borkenhagen did not teach that an instruction is applied to a lookup table that includes entries corresponding to predetermined conditions.

b) Borkenhagen did not teach or suggest executing at least one additional instruction present in a pipeline and storing a result thereof instead of flushing the instruction while preparing to switch to a second thread.

5.   As to a) above, Borkenhagen clearly taught feedback from caches and lookup table was routed to sequencers 350 and then communicated to thread control unit 400 whc8h resulted in a thread switch (see col.9, lines 13-24). Therefore, instruction must be applied to the caches and lookup table for thread switch.
6.   As to b), see obviousness discussions Chaudhry

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains.
Patentability shall not be negatived by the manner in which the invention was made.

7.   Claims 1,3,5,6,30,32 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Borkenhagen et al. (6,076,157) in view of Chaudhry

(2003/0018826).

8.   As to claims 1, Borkenhagen taught (see fig.6) :

a) determining whether execution of an instruction of a first thread may require a long

latency (see the first execution attempt of the instruction of thread T0 in 620) based on a

lookaside table [cache][lookup table] that included entries corresponding to

predetermined conditions (see the virtual to real address mapping, see the control

register bit assignment in co1.13, lines 29-67, col.4, lines 1-21, see cache misses and

lookup table misses in col.9, lines 35-52, see also the comparison of threshold value

with the counter co1.16, lines 11,-37.

9.   These entries in the lookaside table were addresses for read and write purpose.

A unsuccessful lookup into the table would lead to latency in reading. Therefore,

Borkenhagen's lookaside table did determine a potential latency.)

b) preparing to switch to a second thread based on selection of program counter of the

second thread to fetch a next thread (see the switching to a second thread [T1] the

instruction may require the long latency , see the switch to a second thread T1 upon no

completion of the first instruction in 630, co1.16, lines 44-47, see the fetch unit for fetch

requests in co1.8, lines 50-63).

10.   No instruction decoder explicitly shown, but Borkenhagen taught instruction unit

220

(See the instruction unit 220). Therefore, Borkenhagen must have a decoder, or the like

to decode the instructions form the instruction unit 210. No specific type of instruction

decoder has been reflected into the claim. Therefore, it is read as an instruction decoder in general. Examiner also holds that instruction decoder in general had been known in the art.

11.   Borkenhagen did not specifically show the executing of at least one additional instruction in the first thread while preparing to switch to his second thread as claimed. However, Chaudhry taught a system allowing continuing execution of a current thread while switching to another thread (see Paragraph [0012]). One of ordinary skill in the art should be able to recognize a thread is a group of instructions or processes. It would have been obvious to one of ordinary skill in the art to use Chaudhry in Borkenhagen for executing an additional instruction while switching a second thread as claimed because the use of Chaudhry could provide Borkenhagen the ability to maintain the processing of the pending thread before the actual thread switch occurred, thereby conserving the result of last process being already run (e.g. no flushing or resetting), and therefore reducing the time wasted on the switching, and because Borkenhagen also taught an evaluation of the threshold of the thread, no switch would occur if no instruction could be executed (see co1.16, lines 18- 25), which was a suggestion of the need for continuing the execution of the instructions in the current thread while switching the second thread in order to minimize the latency on the result of the switching, and for doing so, provide a motivation.

12.   As to claims 3, Borkenhagen also included a stochastic analysis (see cache miss in co1.15, lines 43-61) of whether the instruction will result a long latency.

13.   As to claim 5, Borkenhagen also taught feedback to the fetch unit (see fetch requests for fetch in co1.8, lines 50-63).

14.   As to claim 6, 32, Borkenhagen taught maximum number of waiting cycles could be customized according to specific hardware configuration and software code,

and was loaded to a time-out register, and could reach to zero (see col.15, lines 10-42).
Therefore, Borkenhagen was also applicable for less than 10 cycles. As to the to
pipeline stage delay, examiner holds that one or ordinary skill in the art should be able
to recognize the customized number of waiting cycles in Borkenhagen was applicable
to any number of delay including 2 pipeline stage delay unless applicant can show the
two pipeline stage delay is unique from the customized number of waiting cycles.

15.   As to claim 30, see different type of instructions for VLIW and superscalar in
col.3, lines 20-33. See also the thread state bits 4:7 for indicating the load instruction or
store instruction in co1.10, lines 42-43. The load instruction is one type and the store
instruction is another type of instruction.

Applicant's amendment necessitated the new ground(s) of rejection presented in
this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP
§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37
CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE
MONTHS from the mailing date of this action. In the event a first reply is filed within
TWO MONTHS of the mailing date of this final action and the advisory action is not
mailed until after the end of the THREE-MONTH shortened statutory period, then the
shortened statutory period will expire on the date the advisory action is mailed, and any
extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of
the advisory action. In no event, however, will the statutory period for reply expire later
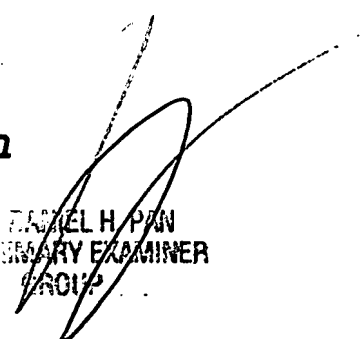than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dan Pan whose telephone number is 571 272 4172. The examiner can normally be reached on M-F from 8:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chan, can be reached on 571 272 4162. The fax phone number for the organization where this application or proceeding is assigned is 703 306 5404.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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